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IN THE UNITED STATES PATENT & TRADEMARK OFFICE

IN RE APPLICATION OF	:
TOSHIMITSU KOHARA, ET AL.	: EXAMINER: BERMAN, J.
SERIAL NO: 10/523,815	:
FILED: FEBRUARY 4, 2005	: GROUP ART UNIT: 1795
FOR: METHOD OF PRODUCING & CRYSTAL STRUCTURE-BASED ALUMINA FILMS	:

REPLY BRIEF UNDER 37 C.F.R. § 41.41

COMMISSIONER FOR PATENTS
ALEXANDRIA, VIRGINIA 22313
SIR:

This is a reply to the Examiner's Answer dated November 25, 2009.

Appellants confirm and continue to rely on the arguments presented in the Appeal Brief filed on July 1, 2009 and August 26, 2009. Additionally, Appellants wish to respond to points that were newly made in the Examiner's Answer, as follows:

I. SPROUL

All of the claims recite a two step method of producing an α crystal structure-based alumina film, including a second step of continuing to form the film on the undercoat formed in the initial step by changing the film forming conditions, whereby an α crystal structure alumina continues to be formed on the undercoat. Dependent Claims 22, 25 and 28-29 recite

specific changed conditions and were rejected under 35 U.S.C. §103 as being obvious over Zywitzki in view of Sproul.

With respect to Zywitzki, the Examiner had deemed that any two of the data points of the coating hardness graph in Fig. 4 of this reference would indicate a two step method of producing an α crystal structure-based alumina film, including a second step of continuing to form the film on the undercoat formed in the initial step by changing the film forming conditions, if the tests producing two hardness data points were performed using the same substrate. Appellants replied that it would make no sense for one skilled in the art to perform coating hardness testing to produce the hardness results shown in Fig. 4 by applying multiple coating layers one-over-the-other on the same substrate since this would produce meaningless results: the hardness of the second and subsequent coating layer being tested would depend on the harness of the layer(s) underneath, which would be different from the measured hardness of the given layer applied directly on the substrate. See pages 5-6 of the Appeal Brief.

With respect to Sproul, the Examiner again relied on a graph (Fig. 15) with discrete data points as evidence of a two step method of producing an α crystal structure-based alumina film, including a second step of continuing to form the film on the undercoat formed in the initial step by changing the film forming conditions, whereby an α crystal structure alumina continues to be formed on the undercoat, if the tests producing two of the discrete data points in Fig. 15 were performed using the same substrate. Applicants had again argued (Appeal Brief, p. 8) that the data points were for separate experiments using separate substrates, and were not the results of tests using the same substrate.

According to the Examiner's Answer (p. 10), the Appeal Brief had not adequately explained why the data points in Fig. 15 of Sproul were for separate experiments using

separate substrates, and were not the results of a continuous test using the same substrate. The Examiner's Answer had also pointed to the description at lines 2-5 of col. 13 in Sproul as evidence that the data points in Fig. 15 of Sproul were the results of a continuous test using the same substrate.

It is respectfully submitted that, as previously implied in the Appeal Brief, one skilled in the art would have recognized that the data points in Fig. 15 of Sproul were for separate experiments using separate substrates, and were not the results of tests using the same substrate, for fundamentally the same reason as in Zywitzki: data points based on use of the same substrate would produce meaningless results.

Fig. 15 of Zywitzki is the result of *plural* experiments (col. 12, line 55: "In the experiments conducted") on *plural* wafers (col. 12, line 50) according to the experimental setup of Fig. 6 and shows the relationship of the deposition rate to the substrate current density, as set according to substrate bias values corresponding to the three data points in Fig. 15. It is intended to "illustrate the impact of increasing substrate current density" on the deposition rate (col. 12, lines 66-67).

It is apparently the Examiner's position that, e.g.,, the deposition rate according to the data point corresponding to a -70 volt substrate bias in Fig. 15 is for the coating laid on the coating previously applied to the same substrate in determining the deposition rate at a -40 volt substrate bias, and that the deposition rate according to the data point corresponding to a -90 volt substrate bias in Fig. 15 is for the coating laid on the coatings previously applied to the same substrate in determining the deposition rates at the -40 volt substrate bias and the -70 volt substrate bias.

Although the order noted above is apparently not critical, the Examiner's position nonetheless requires that the deposition rates at the different data points in Fig. 15 are

determined under conditions that are different from one another in undisclosed ways that would inherently flow from the fact that each measured coating layer is being applied to a *different underlayment*, i.e., to a bare substrate or to an underlayment coating of a different thickness.

This different underlayment in the three data points of Fig. 15 of Sproul represents an uncontrolled experimental variable. If the goal of the experiments whose results are shown in Fig. 15 is to illustrate the impact of increasing substrate current density on the deposition rate, it would make no sense for one skilled in the art to introduce such an uncontrolled experimental variable since it would call into question the validity of the experimental results: are the deposition rates shown in Fig. 15 the result of the differences in substrate current density or only the result of the different underlayments? It would be impossible to know. Thus, one skilled in the art would understand that Fig. 15 of Sproul does not demonstrate a two step method of producing an alumina film, since data points based on use of the same substrate would produce meaningless results.

As for the description at the top of col. 13 in Sproul, this description would be understood by one skilled in the art, in view of the above, to simply mean that the substrate bias potential was varied for the different wafers in the different experiments. It is not evidence of the use of a single substrate for all of the data points.

II. FU

Claim 24 was rejected as being obvious over Zywitzki in view of Fu. Claim 24 recites that the first step is carried out in a poisoning mode and the second step in a metal or transition mode. Appellants had pointed out that Fu instead teaches the possibility of TiN

coating under metal forming conditions (first step) followed by (second step) TiN coating under poisoning conditions – the opposite of what is claimed.

The Examiner's Answer has now pointed to the description on col. 12 (lines 27-29) of Fu that the poison mode can be achieved by immediately turning on the gas flow, and only gradually turning on the DC sputtering power supply. However, since this is a part of a description that the poison mode is sometimes preferred in TiN deposition, and since there is no description of a subsequent metal mode, this description would not teach a first step carried out in a poisoning mode and a second step carried out in a metal or transition mode.

Appellants therefore request that the final rejection be REVERSED.

Respectfully submitted,

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